

**WHAT IS CLAIMED IS:**

1. A stage unit comprising:  
a driver that includes a mover and a stator; and  
5 a reaction canceling mechanism that applies to the  
stator a force to cancel a reaction acting on the stator  
due to driving of the mover by an electromagnetic  
interaction.

10 2. The stage unit according to claim 1, wherein  
the reaction canceling mechanism generates forces, which  
cancel the reaction as a whole, in at least two points of  
the stator.

15 3. The stage unit according to claim 2, wherein  
the reaction acting on the stator and the forces  
generated in at least two points are along a plane.

4. The stage unit according to claim 2 or 3,  
20 wherein the reaction canceling mechanism generates forces,  
61 which cancel the reaction as a whole and have respective  
predetermined directions, in at least three points of the  
stator.

25 5. The stage unit according to claim 1, wherein the  
driver generates a driving force of the mover by an  
electromagnetic interaction.

6. The stage unit according to claim 5, wherein  
the stator comprises an armature unit including a  
plurality of armature coils that are arranged in the  
shape of a matrix and have current paths almost parallel  
5 to the predetermined plane, and

the mover comprises a driving magnetic pole unit  
that generates a magnetic flux having a direction that  
cross the predetermined plane.

10 7. The stage unit according to claim 6, wherein  
the reaction canceling magnetic pole unit comprises  
reaction canceling magnetic pole units that generate  
magnetic fluxes crossing the current paths of armature  
coils arranged on the four corners of the armature unit;  
15 and

a control system that controls the directions and  
amplitudes of currents supplied to the armature coils  
arranged on the four corners of the armature unit.

20 8. The stage unit according to claim 7, wherein the  
reaction canceling magnetic pole units and the stator are  
mechanically independent of each other.

25 9. The stage unit according to claim 7 or 8,  
wherein the reaction canceling magnetic pole units  
generate forces perpendicular to one another on the  
neighboring corners of the armature unit.

10. The making method of a stage unit comprising the steps of:

providing a driver including a mover and a stator; and

5 providing the reaction canceling mechanism that applies a force to cancel the reaction acting on the stator due to driving of the mover to the stator by an electromagnetic interaction.

10 11. A stage unit comprising:

an armature unit that includes a plurality of armature coils, which are arranged in the shape of a matrix and have current paths almost parallel to the predetermined plane;

15 a magnetic pole unit that has a plurality of magnets magnetized in directions not perpendicular to the predetermined plane and two-dimensionally generates an alternating magnetic field with a period of  $4P/3$  in two axis-directions perpendicular to each other, between the 20 armature coils and itself, practically without generating any magnetic field in an area opposite to the armature unit; and

25 a current driver that moves the magnetic pole unit relatively to the armature unit in a plane parallel to the predetermined plane by supplying currents to the respective armature coils.

12. The stage unit according to claim 11 further

comprising:

a magnetic member supporting the armature coil in a side opposite with the magnetic pole unit.

5        13. The stage unit according to claim 11 further comprising:

a flat-plate-like shaped member that is placed between the armature unit and the magnetic pole unit and made of a non-magnetic material.

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14. The stage unit according to claim 11, wherein the current driver supplies currents to the respective armature coils independently.

15        15. The stage unit according to one of claim 11 to 14 further comprising:

a position detection system that detects the positional relation between the magnetic and the armature unit; and

20        a controller that controls at least one of the value and direction of currents supplied to the respective armature coils via the current driver according to the detection results of the position detection system.

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16. The stage unit according to claim 15, wherein the control selectively supplies currents only to the armature coils opposite with the magnetic pole unit.

17. The making method of a stage unit comprising the steps of:

providing an armature unit that includes a plurality 5 of armature coils, which are arranged in the shape of a matrix and have current paths almost parallel to the predetermined plane;

providing a magnetic pole unit that has a plurality 10 of magnets magnetized in directions not perpendicular to the predetermined plane and two-dimensionally generates an alternating magnetic field with a period of  $4P/3$  in two axis-directions perpendicular to each other, between the armature coils and itself, practically without generating any magnetic field in an area opposite to the 15 armature unit; and

providing a current driver that moves the magnetic pole unit relatively to the armature unit in a plane parallel to the predetermined plane by supplying currents to the respective armature coils.

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18. The making method of a stage unit according to claim 17 further comprising the steps of:

providing a position detection system that detects the positional relation between the magnetic and the 25 armature unit; and

providing a controller that controls at least one of the value and direction of currents supplied to the respective armature coils via the current driver

according to the detection results of the position detection system.

19. An exposure apparatus that transfers a predetermined pattern onto a wafer by irradiating an energy beam and exposing the wafer, comprising:  
5 a stage unit according to claim 1 or 11 as the position controller to control the position of the wafer.

10 20. The making method of an exposure apparatus that transfers a predetermined pattern onto a wafer by irradiating an energy beam and exposing the wafer, comprising the steps of:

15 making a stage unit by providing the reaction canceling mechanism that applies a force, which cancels the reaction acting on the stator due to driving of the mover, to the stator by an electromagnetic interaction; and

20 placing the stage unit as the position controller that controls the position of the wafer.

21. The making method of an exposure apparatus that transfers a predetermined pattern onto a wafer by irradiating an energy beam and exposing the wafer, comprising the steps of:

making a stage unit by providing an armature unit including a plurality of armature coils that are arranged in the shape of a matrix and have current paths almost

parallel to the predetermined plane; a magnetic pole unit that has a plurality of magnets magnetized in directions not perpendicular to the predetermined plane and two-dimensionally generates an alternating magnetic field

5 with a period of  $4P/3$  in two axis-directions perpendicular to each other, between the armature coils and itself, practically without generating any magnetic field in an area opposite to the armature unit; and a current driver that moves the magnetic pole unit

10 relatively to the armature unit in a plane parallel to the predetermined plane; and

15 placing the stage unit as the position controller that controls the position of the wafer.

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